7.0 EXISTING ENVIRONMENTAL CONDITIONS

7.1 INTRODUCTION

Existing environmental conditions refers to the characteristics of state forest land at the present time. Most state forest land has been logged at least once in the last 100 years. There is a relatively small portion, approximately 94,120 acres, equivalent to 6.6 percent of the total amount of timber in Western Washington), that is older than 150 years. (See **Table 3** at page 33 for a description of timber by age classification.)

The land holdings addressed in this plan are generally spread out over the state. Thus, the existing condition of state forest land is significantly different from the existing natural condition of the land as it was one hundred or two hundred years ago.

The present forests on state lands in Washington State are the result of many disturbances, both natural and man-made. Because forests are dynamic environments, it is rare that individual stands will reach the end of the stage of succession (climax forest). Wind storms, fire, disease and insects all shape the forest. Major wind storms in Washington State include the 1921 storm on the western Olympic Peninsula and the Columbus Day Storm of 1962, which blew down thousands of acres of mature timber in Western Washington. These are just recent examples of wind storms that have shaped Washington forests throughout the centuries. Major ice storms, such as the 1955 freeze, have also changed the structure of stands all over Western Washington.

Fire has historically been one of the great shapers of forest rebirth and composition in both Eastern and Western Washington. The 94,055-acre Yacolt State Forest in southwest Washington burned several times between 1902 and 1952. These fires have had an important role in shaping the composition and appearance of the present forest. After the original 1902 fire, the forest regenerated only before it was partially reburned ten separate times until 1952. Rehabilitation projects began in 1953 and led to full scale efforts in which thousands of snags were felled to reduce fire hazard and thousands of acres were scarified, planted and/or seeded. Today, the Yacolt State Forest is again forested with young Douglas-fir trees. Only a few old growth remnants (trees greater than 160 year) are scattered in riparian areas and ravines (less than 3% of the Yacolt).

In addition, man has had a great shaping influence on most forest land in the state. People have not only harvested timber, grazed cattle and cleared land, they have also controlled fire and used fire to burn brush and clear the land.

The great majority of state forest land has been harvested at least once. Most Forest Board lands (with the exception of western Clallam County) were clearcut logged in the 1920s and 1930s and abandoned in an unreforested state. (These lands regenerated naturally or were replanted after they were transfered to the state.)

The forests that are visible from along the Interstate 5 corridor, Highways 8 and 12 from Olympia to Aberdeen, and Highway 101 to the Columbia River are second and third forests. State lands are mingled among these forests. There are many large areas of second growth on state forest land, such as the 84,000-acre Capitol State Forest southeast of Olympia, or the 23,095-acre Tahuya State Forest in Mason and Kitsap Counties.

The remnants of logging railroads and abandoned truck roads are scattered on state land in Western Washington, and bear witness to logging in the early twentieth century. These roads are particularly evident in Skagit and Whatcom counties on Forest Board Land. Fire scars on residual trees and charred old growth stumps show the effect of frequent fires in the early 1900s that followed the first logging. These forests by and large came back naturally from the remnant seed sources that survived the fires in large old growth trees and from the hardwoods and other species that survived in the riparian areas. After the fires and/or clearcut logging, alder was able to dominant whole landscapes that once had been dominated by large, old growth conifers. The presence of large conifer stumps under alder stands shows this vegetation change.

In remote locations, some conifer stands greater than 160 years still remain. Many of these stands are at high elevation; they are true fir/hemlock. A 3-foot diameter tree is considered large in these forests. State forest land contains little of the large diameter (4 to 8-foot) Douglas-fir, Western Redcedar, and Western Hemlock forests that come to mind when the public often thinks about old growth. These old forest trees originated by natural means following fire, windstorm and volcanic events.

The department estimates that 45,000 acres of these old growth stands still remain in the forest base (equivalent to about 2 percent of the total inventory on state forest land). They are scattered in remnant stands across 19 counties, and limited to a few protected river bottoms in Western Washington and Northeastern Washington. The best remaining examples of old growth forests are not on state forest land but in Olympic and Rainier National Parks and in some small stands in state parks (such as Rockport State Park in the Skagit Valley).

In sum, the forests of Washington are a series of complex ecosystems which contain duplication of function and many redundant interactions. Centuries of experience and much scientific investigation in moist temperature forests provide support for the concept of forest resilience to disturbance.

Table 3 in the FEIS shows the inventory of state forest by age classes in Western Washington. In general, the stands under 70 years of age originated after logging (1.2 million acres fit this description). Approximately 95% or more of the stands older than 35 years regenerated naturally from local seed stock following logging or natural disturbances.

The department assumes that intensively-managed stands will not become a major source of timber until the year 2040. These younger stands will still contain a variety of species, including hardwoods (such as alder).

7.2 ENVIRONMENTAL CHECKLIST

Existing environmental conditions are discussed in the order as they appear in the environmental checklist contained in **Table 24**. To simplify the format, reduce duplication and improve readability, some of the elements identified in the complete state checklist have been combined, as allowed by WAC 197-11-444.

7.3 PHYSICAL EFFECTS

7.3.1 Earth

7.3.1.1 Geology and Topography

The geologic history of Washington State covers millions of years of erosion, deposition, tectonic movement, glaciation and volcanic activity. Some rocks in northeastern Washington are more than 500 million years old. Glacial deposits that overlie them are only 13,000 years old, and ash from Cascade volcanoes deposited over rocks and glacial debris may be only 2,000 to 6,000 years old.

Washington is divided into seven, physiographic provinces. Each province has its own unique combination of geological and environmental characteristics. Boundaries between provinces are gradual transitions, with a mix of certain features at the boundaries. The provinces and their boundaries are shown in **Table 25** and can be described as follows:

1. Olympic Peninsula. This area includes the core of the Olympic Mountain Range, its foothills and the surrounding lowlands that were not covered by continental glaciation.

TABLE 24 Environmental Checklist

Physical Effects

Earth

Geology and Topography Soils and Erosion (Includes accretion) Unique Physical Features

<u>Air</u>

Air Quality Climate Odor

Water

Surface Water (Includes Movement, Quantity and Quality) Ground Water (Includes Movement, Quantity and Quality) Runoff, Floods and Absorption Public Water Supplies

Land Use

Natural Resources

Rate of Use and Nonrenewable Resources Rate of Use and Renewable Resources

Biological Effects

Flora (Plants)

Numbers and Diversity of Species
Endangered, Threatened and Sensitive Species

Fauna (Animals)

Numbers and Diversity of Species Habitat Endangered, Threatened and Sensitive Species Barriers and/or Corridors

TABLE 24 continued Environmental Checklist

Social Effects

Noise

Light and Glare

Public Services
Police and Fire
Schools
Other Governmental Services

<u>Transportation</u>
Roads and Vehicles
Waterborne, Rail and Air Traffic

Human Health and Population

Recreation and Aesthetics

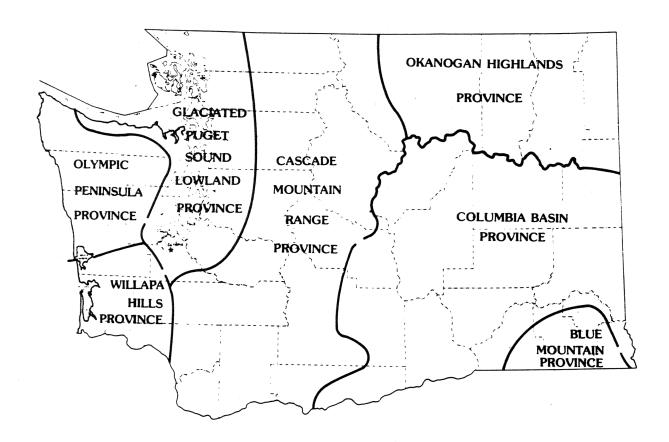
Economics

<u>Historic and Archaeological</u>

Items on the state checklist (WAC 197-11-444) for which there are no significant adverse environmental impacts and which are not analyzed in this FEIS (letters/numbers are from the checklist):

- c (iv) Parking
- c (v) Movement/circulation of people or goods
- d (vi) Communications
- d (vii) Water/storm water (public services)
- d (viii) Sewer/solid waste (public services)

TABLE 25
Physiographic Provinces of Washington State



- 2. Willapa Hills. This area includes the area generally bounded by the Chehalis River to the north, the Columbia River to the south, the Cowlitz River to the east and the Pacific Ocean to the west. The Black Hills are also included in this area, which covers part of southwest Washington.
- 3. Glaciated Puget Sound Lowland. This area consists of all those lowland areas surrounding Puget Sound where continental glaciation has played a primary role in influencing soil characteristics and behavior.
- 4. Cascade Mountain Range. This area is bounded on its northeast corner by the Okanogan Valley, considered part of the adjoining Okanogan Highlands province. Farther south, the eastern boundary of the Cascade Mountain Range Province is the timberland on the Cascade foothills.
- 5. Okanogan Highlands. This area contains the part of Okanogan County from the Okanogan Valley east as well as all of Ferry, Stevens and Pend Oreille Counties and a small part of northern Spokane County in northeast Washington.
- 6. Blue Mountains Province. This area includes the Blue Mountains and the surrounding foothills in southeast Washington.
- 7. Columbia Basin. This area includes the generally nonforested areas of lower elevation in Eastern Washington outside the limits of the Cascade Mountain Range, Okanogan Highlands and Blue Mountains provinces.

Most forest land is located in between the western slopes of the Cascade Mountains and the Pacific Ocean. The coastal area, including the Olympic Peninsula and stretching to the Columbia River, contains the most productive forests. Abundant rainfall and relatively sparse population in productive forest areas, especially on the Olympic Peninsula, contribute significantly to timber productivity. The remaining forest land is on the eastern Cascade slopes and in northeastern Washington.

7.3.1.2 Soils and Erosion

Soil is defined as the earth material at or near the surface of the earth which supports or is capable of supporting plants. Its lower limit is the depth to which roots or the effects of other biological activity have penetrated.

Soil is the fundamental and most important natural resource used in any forest management program. It is the basic medium for forest growth and the storehouse of mineral nutrients and water required by the forest community. State forest land contains a great variability of soils and conditions. Soils are typically the product of the interaction of the following five factors: 1) climate; 2) organisms; 3) parent material; 4) topography; and 5) time. A variation in any one of these five factors can produce significant differences in soil properties and behavior. The wide range of climatic conditions, vegetation types, geological materials, topography, and soil ages which exist across the forest lands of Washington produces an extremely varied collection of soil types.

Soil organisms play a major role in determining soil properties and behavior. Forest practices may indirectly affect forest productivity by directly affecting soil organisms. Forest communities have developed with a strong dependence on mycorrhizal fungi. Forest activities that create soil compaction or severe burning may reduce mycorrhizal fungi populations and may have a negative impact on forest productivity.

Topography, consisting of gradient of slope, slope shape, and position on slope, has a significant influence on the character and behavior of soils. As a general rule, soils formed on steeper slopes tend to be shallower and less developed than soils of the same area found on more gentle topography. The reason is that as slopes increase, the potential for soil removal by erosion and mass wasting also increases.

The textural class of a soil is determined by the relative proportions of clay, silt and sand. The percentages of gravel and other rock fragments are considered textural modifiers. The textural class of a soil has much to do with influencing moisture movements through and into the soil. Moisture movement occurs more frequently in coarse-textured soil and is restricted by fine textures.

Soils with large amounts of incorporated organic matter tend to have a higher degree of structural development; they are more porous and are thus more resistant to water and erosion. The binding action of incorporated soil organic matter also reduces erosion by holding soil particles in place and limiting their detachability.

Erosion is the process of detachment and transportation of soil materials by water, gravity, glacial ice and wind. Moving water (water erosion) and gravity (mass wasting and movements) are the main erosive forces on state forest lands. The most common form of erosion in an undisturbed forest is the detachment of material from a streambank by the flow of water in the channel. Detachment by rainfall or from concentrated runoff is not common unless the soil is disturbed.

The department has undertaken several initial studies of slope stability in relationship to timber harvest and road construction.

7.3.1.3 <u>Unique Physical Features</u>

Washington is a land of great diversity, as seen by the widely-scattered state forest lands which range from lowland to alpine, from wetlands to dry arid stands in the interior part of the state. Table 26 lists the types of unusual physical features in each physiographic province and, where possible, provides examples.

7.3.2 Air

7.3.2.1 Air Quality

The topography and climate west of the Cascade Mountains create a combination of natural conditions that periodically accumulate air pollutants. These conditions include peculiar local and regional wind patterns, abundance of moisture, fog and stable atmospheric conditions with accompanying low level inversions. In Eastern Washington, the most significant feature affecting accumulation of air pollutants is the occurrence of stable atmospheric conditions. These conditions persist for extended periods in populated valleys.

Sources of air contaminants are motor vehicle fumes, industrial processing losses, industrial fuel use, home heating and refuse disposal. The contaminants are primarily sulfur oxides, particulates, carbon monoxide, nitrogen oxides, fluorides and hydrocarbons. Dust and smoke from agricultural and forestry practices contaminate the air on a localized, short-term basis.

Air quality data show the greatest concentrations of air pollution are in King, Pierce, Snohomish and Spokane Counties. Most air pollutants in the Puget Sound Region are released along the eastern shore of Puget Sound between Everett and Tacoma. During periods of stable air contaminants are concentrated in a relatively small area near the point of emission. During moderate or strong winds, contaminants move great distances but are rapidly diluted or dispersed to small concentrations.

Topography especially influences wind patterns in Puget Sound, the Columbia River Gorge and other areas, such as the Spokane and Lewiston-Clarkston valleys. Lowlands tend to accumulate contaminants when pollutant sources are present.

Winter and spring air turbulence and precipitation in Western Washington help dissipate air pollution. During summer hydrocarbons and nitrogen oxides react under the influence of sunlight to cause smog, odor and poor visibility.

TABLE 26 Unusual Physical Features

Feature Example Feature Example OLYMPIC PENINSULA PROVINCE CASCADE MOUNTAIN RANGE PROVINCE Hoh River Valley U-shaped glaciated valley Glacial tarn Sultan Basin V-shaped unglaciated valley Upper Clearwater River Fault-controlled valley Straight Creek fault Moraines of former valley natural dam forming Lake Extensive fault Warwick Fault glaciers Collins slide, Bridge-of-Ouinault Major landslide Incised rivers (gorges) Canyon River the-Gods slide Isolated vista points Mt. Octopus Incised river (gorge) Wind River Large landslide Twin, Lake Sutherland areas Glacial meltwater outwash Lower Oueets, Clearwater plain Rivers OKANOGAN HIGHLANDS PROVINCE Large swamps Lilliwaup Swamp Bedrock pinnacle Kloochman Rock Glacially polished ridges Old Dominion Mt., Parody Hot springs Sol duc Peak Post-glacial faults Saddle Mountain (Lake Giant erratic East of Colville Cushman area) Major modern landslides Kettle Falls area, lower San Poil River Abandoned waterfall, plunge CC Mountain WILLAPA HILLS PROVINCE Abandoned meltwater channel Hoodoo Lakes Ancient terraces Along upper Columbia and Incised rivers (gorges) North River lower Methow Rivers Mature topography (no V-shaped valleys. Ancient landslides Chopaka Mountain "flats") V-shaped ridges Fault-controlled valley Salmon Creek Fossiliferous limestones Bear River area, Republic area Graben valley Willapa Bay Giant ripples Deer Park area Ancient landslides Cape Horn area, near Cathlamet BLUE MOUNTAINS PROVINCE Gorge (incised river) Grande Ronde River GLACIATED PUGET SOUND LOWLAND PROVINCE Dike remnants Canyon of Grande Ronde Glacial meltwater channels Ohop Valley, Cedar Falls Valley Pleistocene delta Steilacoom area Kame terrace Partridge Point area, COLUMBIA BASIN PROVINCE Whidbey Island Devils Lake lineament Fault-controlled valley Anticlines Saddle Mountains, Rattle Moraines from valley Lower Baker River area Snake Hills glaciers Ancient landslide Corfu area, Simcoe Mt., Large ancient landslides West face of Cultus White Bluffs Mountain Spokane Flood channels Sprague/Cheney area Bow Hill, Skagit County Raised beaches (marine Spokane Flood giant ripples LaCrosse area terraces) Cinder cone Jacknife Butte, Hagerty Butte Moraine of continental Tenino area, Pilchuck Gorge Columbia and Snake Rivers glacier River Meltwater channel Moses Coulee Periglacial feature Mima Mounds Waterfall Palouse Falls Kettle Ward Lake Abandoned waterfall Dry Falls Hanging valley Lake Hancock Ancient dunes Palouse Hills Glacially "streamlined" Hartstene Island Steptoes Steptoe Butte, Kamiak Butte topography "Rimrock" lava flows Spokane area Abandoned waterfall, Vail area Periglacial features mounds in Cheney and Fort plunge pool Spokane areas Waterfall Snoqualmie Falls,

Dike remnants

Shield volcano

Moraines - Eskers

Major fault

Modern dunes

Kame terrace

Drumlines

Lone Pine Canyon

Chelan Falls area

Waterville Plateau

Waterville Plateau

Moses Lake and Beverly areas

Warwick fault

Indian Rock

Tumwater Falls

Spanaway, Sumas area

Green Mountain, Mt.

Constitution

Stillaguamish Rivers

Bald Mountain

Sucia Island

Skagit

Sauk and N. Fork

Outwash prairies

Bedrock pinnacle

Isolated vista point

Stream piracy

Synclinal fold

Major delta

Because pollution is interstate as well as intrastate, Oregon, Washington, and Idaho have developed a close working relationship on air quality problems of mutual concern.

7.3.2.2 <u>Climate</u>

Washington's climate is controlled by three factors: 1) location on the windward coast of the Pacific Ocean; 2) the north-south Cascade Mountain range, which runs through the center of the state; and 3) the semipermanent high and low pressure regions located over the north Pacific Ocean. These factors combine to produce dramatically different conditions within short distances. The Cascade Mountains, for instance, effectively block the initial effect of Pacific storms into Eastern Washington, while protecting Western Washington from the polar-continental influence felt in Eastern Washington. Thus, Western Washington has a marine climate and Eastern Washington a marine-continental climate.

Successive, moisture-laden storms move into the Northwest during late fall, winter and early spring. They are intercepted first by coastal ranges (the Olympic Mountains and Willapa Hills) and then by the Cascade Mountains, leaving most of Eastern Washington in a rain shadow with an almost desert-like climate. During late spring, summer and early fall the Pacific high pressure area moves farther north, weakening storms and limiting rainfall.

Annual precipitation ranges from 75 inches along the immediate coast to 175 inches along the western slopes of the Olympic Mountains and nearly 100 inches in the Willapa Hills. The rain-shadow effect, which is created by the Olympic Mountains, results in only 16 to 25 inches on the northeast part of the Olympic Peninsula and parts of the San Juan Islands.

Near the Puget Sound Lowlands south to the Columbia River, the mean annual precipitation is 40 to 60 inches. Precipitation increases along the west slopes of the Cascades, ranging up to 120 inches annually. Striking differences in precipitation totals are also noted on the eastern slopes of the Cascades, decreasing to mean annual amounts of 12 inches at a distance of 40 miles from the crest, and to only eight inches in the southern part of the Central Basin. The amount of precipitation over the Blue Mountains of the southeast and the mountainous area of the northeast measures between 15 and 30 inches.